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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,441	06/27/2002	Timothy S Fisher	N8323-EAS	9157

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WADDEY & PATTERSON
414 UNION STREET, SUITE 2020
BANK OF AMERICA PLAZA
NASHVILLE, TN 37219

EXAMINER

TAMAI, KARL I

ART UNIT	PAPER NUMBER
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2834

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/088,441

Applicant(s)

FISHER ET AL.

Examiner

Tamai IE Karl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9/02, 6/02. 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

2. The disclosure is objected to because of the following informalities: the specification does not include a brief description of figures 11-14.

Appropriate correction is required.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the device operating as an electrical power supply, cone tip, pyramid tip, hydrogen tip, dopant tip, annular gate and the grid gate must be shown or the features canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to under 37 CFR 1.83(a) because they fail to show heat source connected to the cathode as described in the specification on page 15. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

5. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claim 22, 24, and 25 (duplicate numbers in the original claims) been renumbered 27-29. Misnumbered claims 27-55 have been renumbered claims 30-58.

6. Claims 27-29 are objected to under 37 CFR 1.75 as being a substantial duplicate of claim 57-58. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

7. Claim 27 is objected to because of the following informalities: there is no antecedent basis for the base electrode. Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 29-32, 37-40, 45-48, 50-55, 57, and 58 are rejected under 35 U.S.C. 102(b) as being anticipated by Geis et al. (US 5,713,775). Geis teaches an energy conversion device for emitting electrons from a diamond emitter from an enhanced geometric tip, which converts the input current to an emitted electron current by band bending. Geis teaches the tip 34 integral with the base 30. Geis teaches the conversion device in a vacuum, with a micro-nanoscale emitter doped with nitrogen. Geis teaches the anode and cathode reversed biased (figure 2a). It is inherent at there is a power and heat transfer from the base to the anode with the field emission, and that the emission occurs at the base of the tip and at the vacuum. Geis teaches in figures 7a-7c (col. 9, example 3) a gated cathode to bias the cathode over the anode, with an enhanced diamond tip 34 and a gate 32.

10. Claims 30-35, 37, 38, 55, 56, 58, and 59 are rejected under 35 U.S.C. 102(b) as being anticipated by von Windheim (US 5,679,895). Windheim teaches the claimed energy conversion device and the method of converting energy, including a nanocrystalline diamond emitter having a hydrogen tip in the shape of a pyramid or cone. Windheim teaches a gate electrode 42 with a bias voltage source 44.

11. Claim 30-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Aragaki et al. (Aragaki)(JP 11-116555)(US 5,959,400). Aragaki teaches a diamond field emitter with a hydrogen pointed tip, and having an annular gate electrode to provide emission to the anode 2.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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14. Claims 31-35 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geis et al. (US 5,713,775), in view of von Windheim (US 5,679,895). Geis teaches every aspect of the invention except cone or pyramid or hydrogen tip. Von Windheim teaches the emitter tip can be conical or pyramid or hydrogen to provide an enhanced current stream. Von Windheim teaches a grid gate with annular hole (figure 9). It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the converter of Geis with the conical or pyramid or hydrogen to provide an enhanced current stream.

15. Claims 31-34, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geis et al. (US 5,713,775) and Kumar (US 5,399,238). Geis teaches every aspect of the invention except a diamond substrate unitary with the conical or pyramid tips. Kumar teaches a diamond substrate with unitary a conical and pyramid tip diamond emitters to reduce production causes. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the energy converter of Geis with the diamond substrate and tips of Kumar to reduce expenses for production.

16. Claims 36 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geis et al. (US 5,713,775) and Kumar et al. (Kumar)(US 5,614,353). Geis teaches every aspect of the invention except a polycrystalline structure with sp² bonding. Kumar teaches a polycrystalline structure with sp² bonding. Since both Geis and Kumar are used in the field of field emission, it would have been obvious to a person of ordinary

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skill in the art at the time of the invention to construct the emitter of Gies with sp² bonds because Kumar teaches that sp² bonds are common atomic bonds for emitters.

17. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Geis et al. (US 5,713,775) and Kumar (US 5,399,238). Geis and Kumar teach every aspect of the invention except the potentials of the anode, cathode and gate. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the generator of Geis and Kumar with the anode biased higher than the cathode and gate to optimize the performance of the emitter, and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (see *In re Aller*, 105 USPQ 233).

18. Claims 27-33, 35, 37-43, 52-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (US 3,281,372) and Aragaki et al. (Aragaki)(JP 11-116555)(US 5,959,400). Haas teaches a thermal generator having a cathode 23, anode 24, and annular biased gate 25 electrodes in a vacuum container 26. Haas does not teach a diamond emitter with a diamond emitter with a hydrogen, nitrogen, cone or pyramid tip; and an annular or grid gate a hydrogen tip. Aragaki teaches a high density and stable field emitter with a diamond emitter with a hydrogen, nitrogen, cone or pyramid tip; and an annular or grid gate. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the generator of Haas with a diamond/hydrogen emitter to provide a stable field generator, as taught by Aragaki.

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19. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (US 3,281,372) and Aragaki et al. (Aragaki)(JP 11-116555)(US 5,959,400). Haas and Aragaki teach every aspect of the invention except the potentials of the anode, cathode and gate. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the generator of Haas and Aragaki with the anode biased higher than the cathode and gate to optimized the performance of the emitter, and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (see *In re Aller*, 105 USPQ 233).

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (703) 305-7066.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Nestor Ramirez, can be reached at (703) 308-1371. The facsimile number for the Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Karl I Tamai
PRIMARY PATENT EXAMINER
February 5, 2004



KARL TAMAI
PRIMARY EXAMINER